C.1

MECHANICS

AUTO BODY

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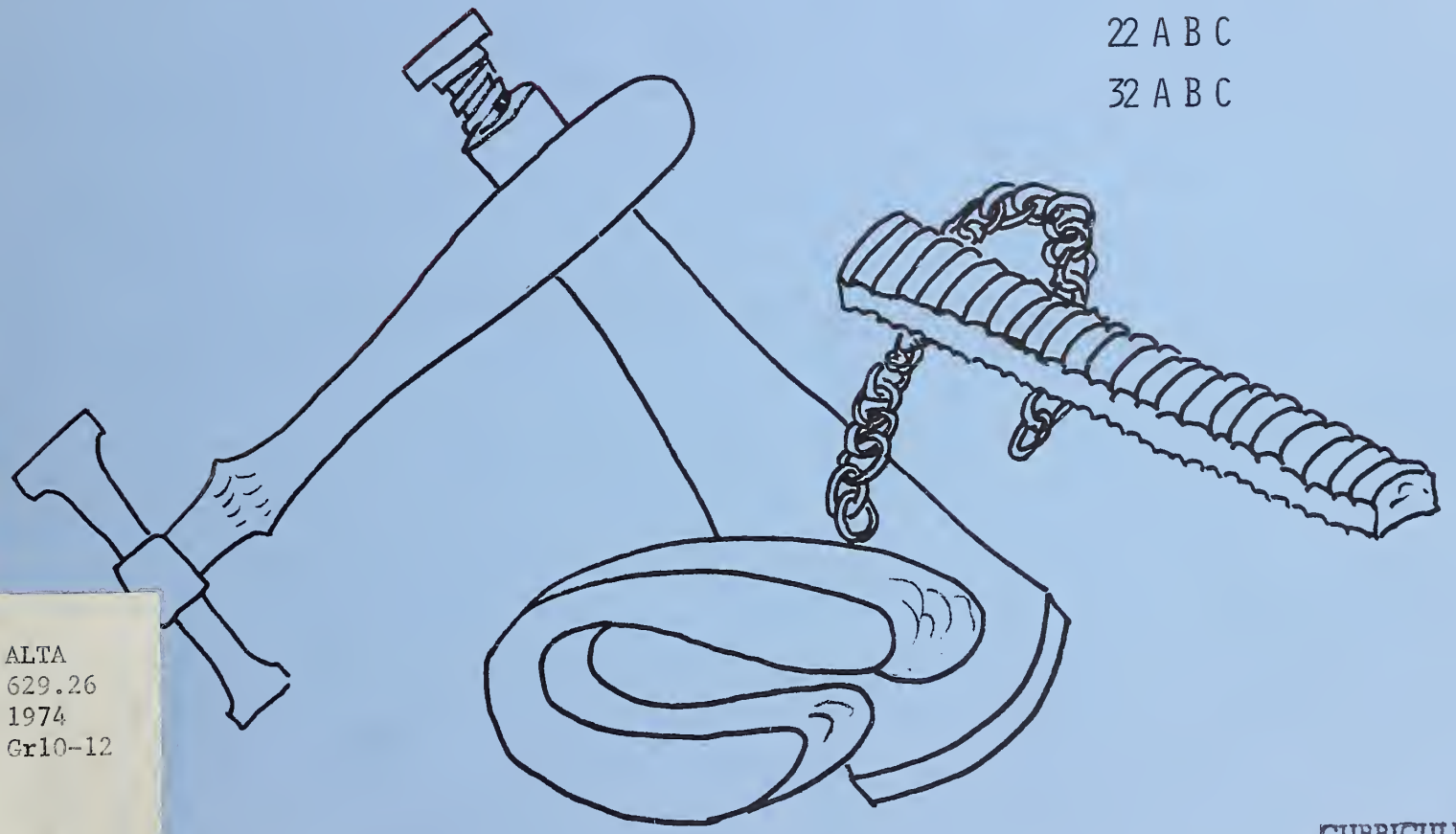
32 A B C



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A C K N O W L E D G M E N T S

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NOTE: This Curriculum Guide is a service publication only. The Senior High School Program of Studies contains the official statement concerning Senior High School courses. The information contained in the Guide is prescriptive insofar as it duplicates that contained in the Program of Studies. There are in the Guide, however, as well as content, methods of developing the concepts, suggestions for the use of teaching aids and lists of additional reference books.

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I. INDUSTRIAL EDUCATION

Industrial Education is a program consisting of courses which provide a continuum of experiences, starting with exploratory activities in the junior high school and expanding in the high school to the development of skills related to career fields. This development of the student's skills is planned for through courses in Industrial Arts and Vocational Education culminating in on-the-job work experience, or entry into a job or post-high school institution for further education.

The program consists of courses ranging from those designed for an exploration of the technologies and trade areas to units of practical preparation for a career. In the process the courses develop the student's knowledge of himself, his talents and his skills.

The Industrial Education course "guides" provide the teacher with an outline of the topics, generalizations and concepts selected as most relevant for the physical and mental development of the students and the logical development of the subject area in accordance with the resources of the school in both teaching personnel and facilities.

The Guide leaves much scope for the teacher to develop content related to the topics, especially in writing behavioral objectives describing specific changes in student behavior anticipated from the learning tasks.

It is expected that each school district will develop a program of Industrial Education appropriate to the fulfilment of the needs of its student clientele.

II. OBJECTIVES

A. Industrial Education Objectives

The general objectives of Industrial Education complement the aims and objectives of the secondary school. The objectives of Industrial Education are:

1. To provide students with the curriculum content designed to develop fundamental tool and procedural skills which help prepare them to enter a family of occupations.

2. To provide students with courses that serve as vehicles which help them relate their academic knowledge to vocational competencies.

3. To provide students the opportunity to develop basic competencies, both academically and in work skills to enter either a job or a post-high school institution for further education.

4. To provide students with the environment whereby they may develop sound attitudes, acceptable work habits, and achieve a feeling of accomplishment.

B. Mechanics Career Field Objectives

The Mechanics courses should give a studentan opportunity to:

1. Obtain exposure to, and a basic understanding of, the career field.

2. Develop the basic skills and knowledge to gain job entry or articulation with post-high school institutions.

3. Develop a standard of craftsmanship acceptable to the trade and to himself.

C. Major Area of Study Objectives

The auto body courses should give the students an opportunity:

1. To develop the concept that every job is unique in the auto body trade.

2. To develop the ability to assess and appraise damage and determine an appropriate course of action.

3. To develop the specialized knowledge and skills necessary to restore original appearance and function.

III. EVALUATION

Evaluation of student growth should be based on stated behavioural changes and specific criteria understood by the students. Allowance should be made for both self and teacher evaluation and in some cases peer evaluation. Evaluation should further be based on the three domains of learning as defined by an Alberta committee of Industrial Education teachers. Their categories are as follows:

a. Verbal and Written Communication

b. Personal Growth

c. Manipulative Skills

The weighting given each of the three measures will depend on the nature of the behaviour being evaluated. For a more detailed treatment of evaluation see the Industrial Education Handbook.

IV. ORGANIZATION

A. Guide Organization

The course Guides are developed on the following pattern:

1. Topic: Each course is subdivided into a number of topics.

2. Generalization: The main generalization or "big" idea that students should learn follows each topic.

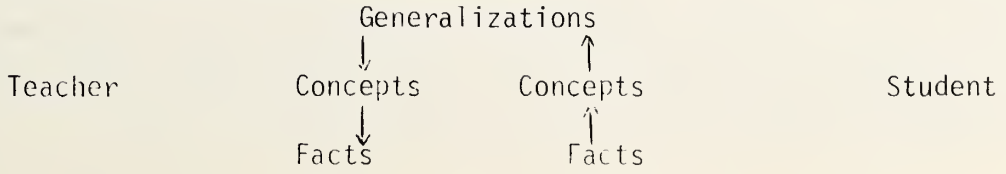
3. Concepts: The concepts divide the topic into the teaching components. They give more direction on specific areas that should be studied.

4. Behavioural Objectives: These describe specific changes in student behaviour which result from the learning tasks he performs.

   The Guide gives only a few sample behavioural objectives. It is the responsibility of the teacher to develop as many behavioural objectives as he can teach in the time available.

Facts are taken to be items of specific information, concepts are categories of information and generalizations express the relationship between concepts.

In planning a lesson, the teacher moves down this hierarchy whereas in learning, the student begins with facts and moves upward.



5. Suggested Activities: A few suggestions are made as to the types of activities that could be used to achieve the behavioural objectives.

6. Resource Materials: This column suggests where materials may be obtained.

B. Program Organization

1. Program Description

The Auto Body modules give students the opportunity to learn the theory and skills necessary in the Auto Body Industry. They will learn to identify and use hand and power tools to perform the major procedures in diagnosing, repairing and rebuilding automobile bodies and chassis. Their jobs can include activities such as disassembling and assembling shop projects or rebuilding a vehicle. In the process they will learn about the trade, job opportunities, business practices and enough skills to get a job, go into apprenticeship or enhance their avocational interests.

2. Major Organization

The major is divided into six five-credit modules and one module of five-ten credits. Entry into the program is through, Mechanics 12, General Technology 10 or Auto Body 12. The second and third level modules ("22" and "32") are all sequential.

32C is the last course in the 35 credit sequence and can be used to:

a. provide greater depth to a module taken previously.

b. take work in actual Auto Body mechanics under a work experience plan whereby the Auto Body teacher supervises the student on the job. The student must be under the supervision of a journeyman while on the job.

In addition to the modules set out in the major for Auto Body a student may select modules designated as minors. These are normally the first level or introductory course of the area, e.g. Electricity would be Electricity-Electronics 12.

A student wishing to meet the requirements of the Apprenticeship Branch must complete all seven modules in the major area.

Some students, however, may take only a few modules in a major area as a supplement to their academic program or they may broaden their selection to other career fields. The scope of the Industrial Education program allows the flexibility necessary for the program to be tailored to meet the interests and needs of the individual class or student.

The chart on Page 6 gives a graphic description of the Auto Body program. Each module is identified and the sequences are indicated by lines, e.g. a student has completed one of Mechanics 12 or General Technology 10 he/she may advance to any module to which the solid line leads. In this case, the student may advance to any module in the sequen

Once a student has enroled in a "22" or second level course he may also select modules from the minor fields.

Students may find some of the courses in the listed related fields beneficial to their career program development.

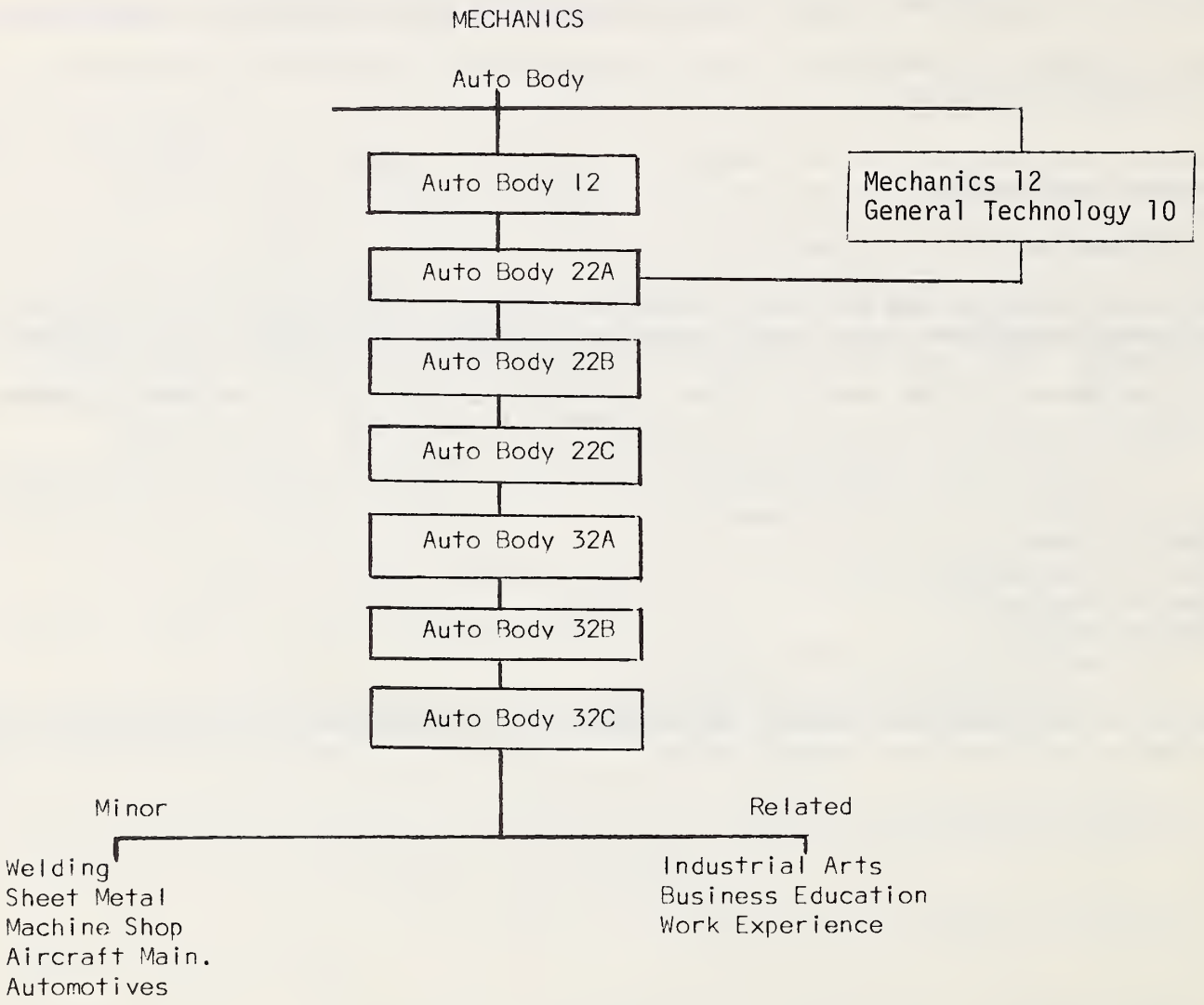
C. Facility Organization

The organization of the physical facilities is in part determined by the original plan. There are however adjustments that can be made in the layout by the teacher to accommodate his/her style of teaching. The number of students in a class affects the way the lab or shop is organized. While most of the shops in Alberta are designed for 16 to 20 students a number of factors must be considered in the final assignment of class load. These factors include:

1. physical size of the shop or laboratory
2. type of student
3. amount of equipment
4. type of programming
5. type of course
6. training and experience of the teacher.

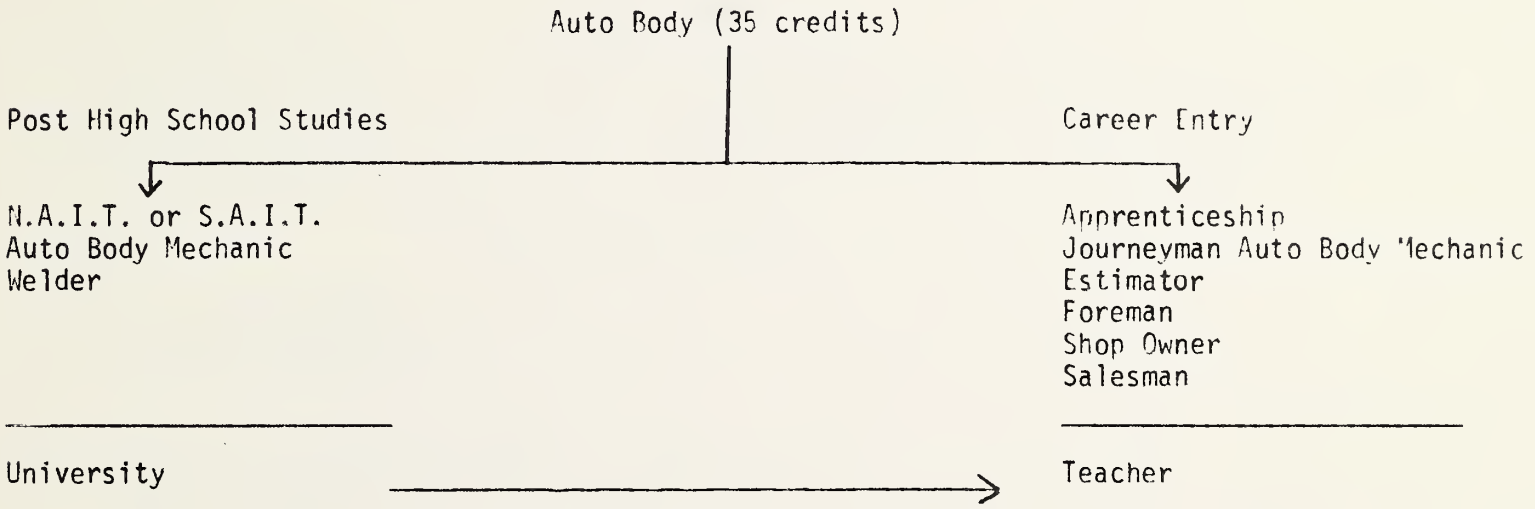
Safety of the students and their opportunity to obtain teacher contact are important considerations when class loads are determined.

C A R E E R F I E L D



V. CAREER OPPORTUNITIES

Students having taken all or most of the modules in the Auto Body major may look forward to the following career areas:



VI. MECHANICS

1. Auto Body 12

INTRODUCTION

Auto Body 12 is the introductory course to the Auto Body program. Content for the 65 hours to be used in the General Technology course is to be selected by the teacher.

I. OBJECTIVES

The objectives of Auto Body 12 are:

1. To provide students with information in respect to career opportunities in Auto Body.
2. To provide students with experiences in handling tools and materials in the reconditioning of auto bodies.

II. CONTENT SUMMARY

1. Career field study
   -employment opportunities
   -trade certification
2. Introduction to auto body work
   -auto body components
   -types of damage
   -special equipment use
3. Safety awareness
4. Shop operation
   -procedures
   -welding exercises
5. Oxy-acetylene welding
   -procedures
   -welding exercise
6. Metal finishing
   -tools and processes
7. Painting
   -surface preparation
   -undercoating
   -paint application

III. REFERENCES

No single textbook is recommended. The following references are suggested:

* Hogg, W. J., *Auto Body Repair & Refinishing.*

* MacPherson, *Collision Repair Guide.*

Spice, *Automotive Collision Work.*

Sargent, *Automotive Sheet Metal Repair.* (2nd revised edition)

Lindey, K.R., *Fundamentals of Auto Body Repair.* Sir Isaac Pitman (Canada) Limited, 1968.

* Most Useful.

IV. CONTENT

Generalizations, concepts and behavioural objectives are outlined on the following pages. Teachers are expected to develop additional behavioural objectives and activities to supplement the identified content and maintain relevancy.

Career Field: Mechanics

Topic I: CAREER FIELD STUDY

Major: Auto Body

Generalization A: There are many occupations within & related to the field of mechanics.

Course: Auto Body 12

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Career Field Occupations		The student will: a. read about the various occupations available in the career field and entry requirements. b. list courses offered in his school system in the career field.		
2. Employment Opportunities - local - regional - national		a. discuss employment opportunities in his career choice.		
3. Trade Certification		a. explain journeyman certification requirements.		
4. Trade Opportunities		a. list the various occupations in and related to the Auto Body trade.		

Notes:

Generalization B: The Auto Body is made up of various components which may be damaged by collision, upset or corrosion. These are repaired in an Auto Body shop.

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Auto Body Components		The student will: a. identify the six divisions of the auto body and repair their functions: - body shell - fenders - hood - grille - bumpers - frame.		
2. Repairing Components - types of damage		a. identify the three major causes of Auto Body damage and describe the general problems associated with the repair of each: - collision & sideswiping - upset or roll-over - corrosion.		
3. Special Equipment Use		a. identify and use correctly various hand tools peculiar to Auto Body. b. identify and use major pieces or repair equipment.		

Notes:

Generalization

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Unsafe Act		The student will: a. list the consequences of unsafe acts particularly relating to: - hoists - jacking devices - jackstands - compressed air - eye injury - lifting - hot metal - sharp metal - hand tools - power equipment - welding equipment.		
2. Unsafe Conditions		a. list possible unsafe conditions which might lead to injuries.		
3. Accident Reporting		a. explain purpose and use of accident report forms and use these when reporting an accident.		
4. Compensation		a. explain the function of and benefits available under the Workmens' Compensation Act.		

Notes:

Generalization D: A well run shop depends on organized procedures and a clean, safe environment.

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Procedures		The student will: a. describe procedures to be followed in the Auto Body shop. b. analyze these procedures in order to increase efficiency.		
2. Clean-up		a. participate in daily shop clean-up.		

Notes:

Topic V: OXY-ACETYLENE WELDING - INTRODUCTION

Generalization E: Oxy-acetylene equipment is used as a concentrated source of heat for various purposes including fusion of metals.

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Parts		The student will: a. identify and explain the function of: - cylinders, regulators, gauges, hoses, fittings, torch, tip and goggles.		
2. Procedures		a. safely and correctly use the gas welding equipment for the following operations on 18 or 20 gauge steel: - puddling-flat position - line of fusion - without rod-flat position - line of fusion with rod - flat position - weld coupons - flat position - weld coupons - horizontal position - weld coupons - vertical position.		

Notes:

Topic VI: METAL FINISHING

Generalization F: Metal working and finishing are essential skills in Auto Body repair.

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Tools and Processes		The student will: a. identify, explain the function of and correctly use the following tools and equipment to prepare metal for painting: - body hammers - dollies - body jack - spoons - picks - hooks - disc sander - body file.		

Notes:

Topic VII: PAINTING

Generalization G: The final finish depends on good surface preparation and proper paint application.

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Surface Preparation		The student will: a. describe the requirements for good adhesion and explain how the texture adhesion conflict is resolved. b. identify and explain the use of various abrasives. c. correctly use these abrasives when sanding painted surfaces for tooth and feathering, wet sanding, dry sanding and machine sanding prior to finishing.		
2. Painting (i.) Undercoats		a. explain the composition, function and purpose of primer surfacer. b. apply primer-surfacer to bare metal and filled surfaces. c. sand primed surfaces for paint application.		

Notes:

Generalization

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
(ii.) Paint Application		d. disassemble, clean and reassemble spray guns, identify parts and explain their function. e. identify parts and explain function of hoses, gauges, regulators and filters. f. correctly use spray equipment to apply finishing materials.		

Notes:

VI. MECHANICS

2. Auto Body 22A

INTRODUCTION

Students may advance to Auto Body 22A from Auto Body 12, General Technology 10 or Mechanics 12.

I. OBJECTIVES

The objectives of Auto Body 22A are to provide students with hands-on experiences in analyzing damage, aligning parts and shaping and finishing damaged parts.

II. CONTENT SUMMARY

1. Alignment
   -analysis of damage
   -use of templates

2. Auto body welding
   -metals
   -practice welds
   -cutting

3. Metal finishing
   -use of heat
   -filling metal
   -painting

4. Auto Body trim and hardware

III. REFERENCES

No single textbook is recommended. The following references are suggested:

Venk, et al. *Automotive Collision Work.* (3rd edition).

Sargent. *Automotive Sheet Metal Repair.* (2nd revised edition).

Lindey, K. R. *Fundamentals of Auto Body Repair.* Sir Isaac Pitman (Canada) Limited, 1968.

IV. CONTENT

Generalizations, concepts and behavioural objectives are outlined on the following pages. Teachers are expected to develop additional behavioural objectives and activities to supplement the identified content and maintain relevancy.

Topic I: INTRODUCTION TO ALIGNMENT

Major: Auto Body

Generalization A: The correct position of components in relation to each other is important for the operation and proper function of each.

Course: Auto Body 22A

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Analysis of damage		The student will: a. detect mis-aligned components such as: (i.) headlights (ii.) fenders (iii.) bumpers (iv.) wheel clearance in fenders.		
2. Alignment		a. check body components for: (i.) spacing (ii.) overlap (iii.) protrusion by operating and/or fitting. b. construct templates to check curves and intricate bends by obtaining the pattern from undamaged vehicles of the same year and model. c. construct single trammed bars for comparison measurement.		

Notes:

Generalization B: The Auto Body mechanic must have skill in Welding.

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Metals		The student will: a. identify and describe the characteristics of commonly used metals in auto bodies: (i.) lead (ii.) white metal (iii.) aluminum (iv.) copper (v.) steel - low and high carbon - alloyed - mild (vi.) cast iron.		
2. Welding		a. practice welding cracked and torn body metal. b. apply bronze to body metal. c. use oxy-acetylene cutting torch to cut metal to 1/4" thick.		

Notes:

Generalization C: Metal working and finishing are essential skills in Auto Body repair.

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Specialized treatment		The student will: a. make edge repairs. b. reshape impressed creases and ridges.		
2. Use of heat		a. use heat to shrink metal. b. use heat to forge metal. c. normalize metal.		
3. Filling metal		a. hot fill metal by tinning, wiping, paddling and finishing body solder. b. cold fill metal by mixing and applying polyester resins.		
4. Painting		a. identify three types of paint used in Auto Body work: (i.) lacquers (ii.) enamels (iii.) acrylics b. prepare paint for spraying. c. prepare body for painting.		

Notes:

Generalization

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Interior trim		The student will: a. identify, remove and examine: - interior door trim panels - interior quarter panels - pillar facing - kick pads - headlining - arm rests - garnish moldings. b. repair and replace components using appropriate fasteners: - panel clips - sheet metal screws - spring clips - tapered compression springs.		
2. Hinges		a. identify, examine and replace damaged hinges on: - doors - deck lid - hood.		

Notes:

VI. MECHANICS

3. Auto Body 22B

INTRODUCTION

Students advance to Auto Body 22B from 22A or they take the two courses concurrently.

I. OBJECTIVES

The objectives of Auto Body 22B are to:

1. Acquaint students with an efficient shop layout.
2. Provide students with practice in shaping, welding, aligning and painting body parts.

II. CONTENT SUMMARY

1. Shop operation
   -communications
   -tools
   -shop design

2. Auto body construction
   -body component shaping
   -assembly-welding, fasteners
   -seat construction

3. Alignment theory and practice
   -methods
   -body jack

4. Auto body welding
   -types of welding
   -joints
   -light metal

5. Door repairs

III. REFERENCES

No single textbook is recommended. The following references are suggested.

Venk, et al., *Automotive Collision Work.* (3rd edition).

Sargent. *Automotive Sheet Metal Repair.* (2nd revised edition).

Lindey, K.R. *Fundamentals of Auto Body Repair.* Sir Isaac Pitman (Canada) Limited, 1968.

IV. CONTENT

Generalizations, concepts and behavioural objectives are outlined on the following pages. Teachers are expected to develop additional behavioural objectives and activities to supplement the identified content and maintain relevancy.

Topic I: SHOP OPERATION

Major: Auto Body

Generalization A: Efficient and safe shop operations depends on facility design, adequate tools and effective communication.

Course: Auto Body 22B

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Communication		The student will: a. identify and describe: (i.) major auto body parts (ii.) terms used in procedures (iii.) methods of procedure (iv.) major auto body problems.		
2. Tools		a. identify the kinds and describe the use of: (i.) pliers (ii.) screwdriver (iii.) wrenches (iv.) socket sets.		
3. Shop design		a. examine auto body shop plans and sketch a plan of a facility with careful consideration given to: (i.) access doors (ii.) location and size of stalls (iii.) wash stall (iv.) spray booth		

Notes:

Topic I: SHOP OPERATION (Continued)

Generalization

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
		(v.) equipment layout (vi.) benches and cupboards (vii.) office and supply room.		

Notes:

Generalization B: Cost of Auto Body repairs is dependent on the design of the vehicle and assembly procedure.

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Body component shaping (i.) cold press (ii.) material		The student will: a. discuss the various shapes and bends that increase strength. b. describe the stamping presses. c. describe the material used for forming bodies.		
2. Assembly (i.) welding		a. describe the advantages of spot welding.		
(ii.) framing jigs		b. describe the use of jigs and their advantages.		
(iii.) mechanical fasteners		c. identify the kinds and sizes of: - nuts and bolts - machine screws - sheet metal screw - speed nuts - molding and trim fasteners - spring clips - hog rings.		

Notes:

Generalization

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
3. Seat Construction (i.) parts (ii.) styles (iii.) construction		a. describe: (i.) the parts and different styles of seats (ii.) methods of fastening seats to the body.		

Notes:

Topic III: ALIGNMENT THEORY AND APPLICATION

Generalization C: Body alignment is basic to the handling and safety of a vehicle.

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Methods of Alignment		The student will: a. discuss methods of alignment which includes: (i.) adjusting (ii.) shimming (iii.) bending (iv.) jacking. b. explain the tolerance of fit. c. describe types of fasteners used: spotted nuts caged nuts tapped caged plates.		
2. Body Jack		a. discuss types: hydraulic friction. b. identify parts and functions.		

Notes:

Topic IV: AUTO BODY WELDING

Generalization D: The Auto Body mechanic must have skill in using the oxy-acetylene welder.

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Welding types (i.) fusion (ii.) brazing		The student will: a. make welds of the following kinds: (i.) fusion (ii.) braze.		
2. Types of Welding Joints		a. define, draw diagrams and list applications of the following welds: (i.) butt (ii.) lap (iii.) fillet (iv.) corner (v.) flange.		
3. Welding Light Metal		a. weld light metal. b. describe where the torch is best used. c. discuss the use of spot welding.		

Notes:

Topic V: DOOR REPAIRS

Generalization

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Doors (i.) removal (ii.) repair (iii.) painting		The student will: a. remove, repair and replace a door with consideration given to: - trim - handles - lock - glass and regulator - cleaning and lubricating lock - replacement of parts. b. practice bumping, dinging, picking and filing low crown metal. c. practice using cold filling. d. practice using hot filling. e. paint a door: - mask - sand - prime - enamel - clean-up.		

Notes:

VI. MECHANICS

4. Auto Body 22C

INTRODUCTION

Students must complete 22B before proceeding to 22C.

I. OBJECTIVES

The objectives of Auto Body 22C are to:

1. provide students with experiences in management procedures and labor relations.
2. provide students with practice in heavy welding, bumper and frame repair and panel work.

II. CONTENT SUMMARY

1. The auto body trade
   -management
   -labor relations
2. Introduction to heavy welding
   -cutting
   -gas welding
   -brazing
   -arc welding
3. Bumper repair
4. Frame repair
5. Practice panel

III. REFERENCES

No single textbook is recommended. The following references are suggested:

Venk, et al. *Automotive Collision Work*. (3rd edition).

Sargent. *Automotive Sheet Metal Repair*. (2nd revised edition).

Lindey, K.R. *Fundamentals of Auto Body Repair*. Sir Isaac Pitman (Canada) Limited, 1968.

IV. CONTENT

Generalizations, concepts and behavioural objectives are outlined on the following pages. Teachers are expected to develop additional behavioural objectives and activities to supplement the identified content and maintain relevancy.

Topic I: AUTO BODY TRADE

Major: Auto Body

Generalization A: An understanding of shop management, employer-employee relations and labor unions is important to employers in the trade.

Course: Auto Body 22C

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Management		The student will:		
(i.) overhead		a. describe the function of the elements listed below in the operation of a business: (i.) location (ii.) rent and utilities (iii.) advertising (iv.) supplies and parts.		
(ii.) personnel		b. discuss: (i.) pay-roll deductions (ii.) wages and labor rates (iii.) Workmens' Compensation.		
(iii.) bookkeeping		c. discuss: (i.) necessity of keeping books (ii.) profits - gross - net .		

Notes:

Generalization

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
2. Labor Relations		a. describe the: (i.) apprenticeship system (ii.) unions involved in auto body. b. discuss problems related to employee-employer relationships.		

Notes:

Topic II: INTRODUCTION TO HEAVY WELDING

Generalization B. The Auto Body mechanic must have skill in using the oxy-acetylene welder.

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Cutting		The student will: a. cut 1/8" mild steel with the oxy-acetylene torch.		
2. Welding		a. using correct tips weld metal up to 1/8" thick. b. weld heavy plates on light gauge body metal.		
3. Brazing		a. braze butt and lap joints on heavy gauge metal. b. using an arc welder, weld butt joints using 1/8" steel.		
4. Arc Welding				

Notes:

Generalization

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Bumper Repair		The student will: a. identify the parts of a bumper. b. remove and repair a bumper.		
2. Frame Repair		a. given a damaged bumper: (i.) disassemble (ii.) check frame alignment and make corrections (iii.) replace reconditioned bumper.		

Notes:

Topic IV: PRACTICE PANEL

Generalization

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Setting up and Shaping		The student will: a. set up and shape a 20" X 20" C.R. 20 gauge steel material into a squared and bent shape to fit a 16" X 16" open top table.		
2. Welding		a. cut a 6" square from the center of the panel and re-weld a new square in its place.		
3. Finishing		a. by dinging, filling and picking finish the metal.		
4. Hot Filling		a. complete an exercise in hot filling.		
5. Painting		a. prepare the metal for painting. b. paint the panel in four colors. c. clean and polish the completed paint job.		

Notes:

VI. MECHANICS

5. Auto Body 32A

INTRODUCTION

Students must have completed the 22 modules before advancing to Auto Body 32A.

I. OBJECTIVES

The objectives of Auto Body 32A are to:

1. provide students with estimating practice
2. provide students with experience in painting and finishing an automobile.

II. CONTENT SUMMARY

1. Estimating auto body damage
   -estimating costs
   -assessing parts and labor
   -sources of parts
2. Spray booth operation
3. Auto body alignment
   -shaping and fitting components
4. Metal finishing
   -patching
5. Live repair
   -repair fenders, doors, hood, deck lid
   -paint a vehicle

III. REFERENCES

No single textbook is recommended. The following references are suggested:

Venk, et al. *Automotive Collision Work.* (3rd edition).

Sargent. *Automotive Sheet Metal Repair.* (2nd edition).

Lindey, K. R. *Fundamentals of Auto Body Repair.* Sir Isaac Pitman (Canada)LLimited, 1968.

IV. CONTENT

Generalizations, concepts and behavioural objectives are outlined on the following pages. Teachers are expected to develop additional behavioural objectives and activities to supplement the identified content and maintain relevancy.

Topic I: ESTIMATING AUTO BODY DAMAGE

Major: Auto Body

Generalization A: Competence in estimating Auto Body damage is necessary to make the decision on whether to repair or not.

Course: Auto Body 32A

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Assessing Damage		The student will: a. estimate the cost of repairing a heavily damaged vehicle and: (i.) determine cost of repair (ii.) determine present value of vehicle (iii.) decide whether to repair.		
2. Assessing parts and repairs		a. given a damaged part estimate: (i.) repair costs (ii.) replacement cost (iii.) labor costs of replacement.		
3. Sources of parts		a. list sources of used body components.		

Notes:

Generalization B: Spray finishing is an important operation in the rebuilding of automobile bodies.

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Spray Booth		The student will: a. visit various body shops and sketch the layout of their spray booth. b. survey the literature available. c. write an essay comparing the built-in paint rooms versus semi-portable spray booths.		
2. Drying		a. explain advantages of force drying. b. explain the use of heat lamps. c. additives in enamels to force dry.		

Notes:

Generalization C: The correct position of components in relation to each other is important for the operation and proper function of each.

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Shaping and Fitting		The student will:		
(i.) Components		a. shape and fit damaged components to their respective openings by taking into account both contour and spacing.		
(ii.) Doors		b. fit a door.		
(iii.) Trunk lid		c. fit a trunk lid.		
(iv.) Decks		d. fit a deck lid.		
(v.) Glass		e. fit a windshield.		

Notes:

Generalization

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Metal Finishing		The student will: a. read periodicals, manufacturers brochures and catalogues related to auto body practices. b. observe techniques and procedures used by professionals.		
2. Metal Filling		a. patch auto body parts by: - cutting back a rusted or damaged area - welding or brazing in good metal - filling and finishing. b. construct a slide hammer.		

Notes:

Topic V: LIVE REPAIRS

Generalization

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
		The student will: a. repair a: - fender - door - deck lid - hood - finish and paint. b. do two major paint jobs.		

Notes:

VI. MECHANICS

6. Auto Body 32B

INTRODUCTION

Students must have completed 32A before advancing to Auto Body 32B.

I. OBJECTIVES

The objectives of Auto Body 32B are to:

1. acquaint students with business practices in estimating and making out work orders.
2. provide the students with practice in all phases of body work.

II. CONTENT SUMMARY

1. Estimating and work orders
   -forms
2. Painting
   -technical information sources
   -mixing paint
   -applying paint
3. Frames and alignment
   -frame straighteners
   -wheel alignment
4. Welding
   -types of joints
   -brazing
   -arc welding

III. REFERENCES

No single textbook is recommended. The following references are suggested:

Venk, et al. *Automotive Collision Work.* (3rd edition).

Sargent. *Automotive Sheet Metal Repair.* (2nd revised edition).

Lindey, K.R. *Fundamentals of Auto Body Repair.* Sir Isaac Pitman (Canada) Limited, 1968

IV. CONTENT

Generalizations, concepts and behavioural objectives are outlined on the following pages. Teachers are expected to develop additional behavioural objectives and activities to supplement the identified content and maintain relevancy.

Career Field: Mechanics

Topic I: ESTIMATING AND WORK ORDERS

Major: Auto Body

Generalization A: A knowledge of office practices as they relate to writing up estimates and work orders is part of the Auto Body mechanics routine.

Course: Auto Body 32B.

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Estimating		The student will: a. study a standard estimate sheet supplied by the insurance company. b. study a personalized form. c. make out a combination estimate and work order sheet.		
2. Forms		a. complete an estimate form.		

Notes:

Generalization B: The final finish depends on good surface preparation and proper paint application.

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Information Sources		The student will: a. collect technical information from major paint companies, manuals and reference books. b. study factory codes for colors. c. identify code locations: - door frames - cowls.		
2. Mixing Paint		a. use a formula manual to mix paint and drier.		
3. Typing of Paint		a. list the basic characteristics of: (i.) lacquer (ii.) enamel (iii.) acrylic.		
4. Painting		a. apply paint to an auto body. b. polish a paint job.		

Notes:

Generalization C: The correct position of components in relation to each other is important for the safe operation and proper function of each.

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Frames		The student will: a. describe various types of frames used. b. identify the parts of a frame.		
2. Frame Straighteners		a. evaluate need for this type of equipment. b. describe different types of frame straighteners listing advantages.		
3. Wheel Alignment		a. describe types of equipment. b. explain general theory of wheel alignment. c. using available equipment, align the wheels of a car.		

Notes:

Topic IV. WELDING

Generalization C: Welding is an important skill for the Auto Body mechanic to have.

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Joints		The student will: a. weld light coupons held in various positions utilizing various joints.		
2. Brazing		a. make patches, laps, cut out and replace metal.		
3. Arc Welding		a. name the types of welders. b. list advantages of both types. c. identify types of rods appropriate for special jobs. d. make live repairs.		

Notes:

Generalization

Concept and Sub-Concepts	Approx. Time	Behavioural Objectives	Activities or Jobs	Resources
1. Glass installation		The student will: a. install windshields and side glass.		
2. Headlining -construction -installation		a. install headlining.		
3. Electric Wiring		a. install new wiring as needed.		

VI. MECHANICS

7. Auto Body 32C

INTRODUCTION

The final module in the Auto Body major is open to students who have completed 30 credits or six modules in the major.

The 125 hours of instruction time available in this module may be used to:

a. provide greater depth to a module taken previously in the sequence. Individual students, groups of students or the whole class may elect to study an area in depth. This depth study could be in advanced alignment, welding, painting or any of the topics in the Auto Body sequence.

b. engage in actual auto body work on the job supervised by the Auto Body teacher as a work coordinator and by a journeyman.

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